Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

# Epidemiological Survey on Stray Dogs and Cats Gastro-Intestinal Parasites in Kirkuk province, Iraq

Husain F. Hassan[1], Abdul Kadir R. A. Barzinji[2]

[1] Biology Department, College of Science, Kirkuk University, Iraq.
[2] Biology Department, College of Education\Al-Hawija, University of Kirkuk, Iraq.

[2]gaylan_phd2@yahoo.com

## ABSTRACT

Gastro-intestinal parasites (GIPs) of stray dogs and cats play an epidemiological critical role, and also play a major role in transmitting through contamination of soil, food and/or drinking water with GIPs faecals. The objective of this study was to screening the prevalence of gastrointestinal parasites in stray dogs and cats in Kirkuk province, Iraq.

Fresh faecal specimens (n=125) of stray dogs and cats were collected during 15th February 2015 till 15th February 2016 from different regions of Kirkuk province. The experimental processing were carried out within 24 h.s using flotation techniques, and stained using Ziehl–Neelsen, trichrome and iodine staining technique protocols.

The overall significant prevalence of GIPs among stray dogs (n=77) was 84.42%, these were *Toxocara canis* (25.98%), *Diphylobotherium latum* (23.38%), *Isospora* spp. (20.78%), *Dipylidium caninum* (16.88%), *Taenia hydatigera* (14.29%), *Echinicoccus* spp. (6.49%), *Mesocestoides* spp. (6.49%), *Cryptosporidium* spp. (6.49%), *Ancylostoma caninum* (2.59%) and *Stongyloides* sp. (1.3%). Of 48 stray cats faecal specimens subjected to the present study, 77.08% were positive for GIPs significantly, including *Toxocara cati* (39.58%), *Ancylostoma tubaeforme* (22.92%), *Taenia taeniaeformis* (14.58%), *Toxascaris leonina* (6.25%), *Diphylobotherium latum* (6.25%), *Cryptosporidium* spp. (27.08%), *Isospora* spp. (10.41%) and *Toxoplasma gondii* (8.33%).

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

Among infected stray dogs *Toxocara canis* and *Ancylostoma caninum* are the commonest GIPs in the present study. While, *Toxocara cati* and *Ancylostoma tubaeforme* are the most prevalence among stray cats in Kirkuk province.

Among infected stray dogs *Toxocara canis* and *Ancylostoma caninum* are the commonest GIP[s] in the present study. While, *Toxocara cati* and *Ancylostoma tubaeforme* are the most prevalence among stray cats in Kirkuk province.

**Keywords:** Stray dogs, Cats, Intestinal parasites, Epidemiology, Kirkuk, Iraq.

# مسح وبائي على الطفيليات المعوية للكلاب والقطط السائبة في محافظة كركوك، العراق

حسين فاضل حسن[1] و عبدالقادر رؤوف أحمد البرزنجي[2]

[1]قسم علوم الحياة، كلية العلوم، جامعة كركوك،كركوك، العراق.
[2]قسم علوم الحياة، كلية التربية/الحويجة، جامعة كركوك، كركوك، العراق

[2]gaylan_phd2@yahoo.com

## الملخص

الطفيليات المعوية للكلاب والقطط السائبة تلعب دورا وبائيا خطيرا، كما انها تلعب دورا رئيسيا في تلوث التربة، الاغذية ومياه الشرب بفضلاتها الملوثة بأطوار هذه الطفيليات. والهدف من اجراء هذه الدراسة هو التحري عن انتشار الطفيليات المعوية في الكلاب والقطط السائبة في محافظة كركوك، العراق. فحصت 125 عينة براز للكلاب والقطط السائبة والتي جمعت من مختلف مناطق محافظة كركوك بواسطة طريقة التطويف. كانت نسب الاصابة بين الكلاب بمختلف الطفيليات 84.42% وهي:

*Toxocara canis* (25.98%), *Diphylobotherium latum* (23.38%), *Isospora* spp. (20.78%), *Dipylidium caninum* (16.88%), *Taenia hydatigera* (14.29%), *Echinicoccus* spp. (6.49%), *Mesocestoides* spp. (6.49%), *Cryptosporidium* spp. (6.49%), *Ancylostoma caninum* (2.59%), *Stongyloides* sp. (1.3%).9

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

بينما نسبة الاصابة بين القطط السائبة كانت 77.08% بمختلف الطفيليات المعوية وهي:

*Toxocara cati* (39.58%), *Ancylostoma tubaeforme* (22.92%), *Taenia taeniaeformis* (14.58%), *Toxascaris leonina* (6.25%), *Diphylobotherium latum* (6.25%), *Cryptosporidium* spp. (27.08%), *Isospora* spp. (10.41%) and *Toxoplasma gondii*.

( وكانت الطفيليات المعوية الاكثر انتشارا بين الكلاب السائبة بمختلف الاعمار في محافظة كركوك هي8.33%)

، بينما الطفيليات الاكثر انتشارا بين القطط السائبة كانت *Toxocara canis* and *Ancylostoma caninum*

*Toxocara cati* and *Ancylostoma tubaeforme*

**الكلمات الدالة :** الكلاب السائبة، القطط السائبة، الطفيليات المعوية، الوبائية، كركوك، العراق.

## 1. Introduction

Stray dogs and cats are considered as domestic animals, and frequently infected by gastro-intestinal parasites. Moreover, several canine and feline hosts may carry several zoonotic pathogenic infectious intestinal parasites that caused potential health hazards [1]. The parasitic zoonoses of dogs and cats, such as Toxocara canis, Giardia intestinalis, *Neospora caninum, Cryptosporidium* spp., *Toxoplasma gondii* and *Echinococcus granulosus* are common incidence [2,3]. The epidemiological studies revealed that the prevalence of intestinal parasites among dogs and cats worldwide is vary, and might be dependent on geographical distribution , habits of the local animal populations and season of the year. The prevalence of the intestinal parasites in stray animals is higher than the pets [4].

The most tangible of the prevalence of these intestinal parasites is the cost of expensive medical treatment for human cases. In many countries, echinococcosis is a major public health problem and can cause severe morbidity and mortality in humans. As a result, economic losses occur for the individual, family, and society. In addition, echinococcosis infects slaughtered animals, which leads to further economic losses [5, 6].

The present investigation was carried out to determine the prevalence of gastro-intestinal zoonotic parasites in dogs and cats, and to ascertain the awareness about canine and feline parasite zoonoses in Kirkuk province.

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

## 2. Materials and Method

- **Study Area**

The present study was carried out in the Biology Department, advance research laboratories, College of Science, Kirkuk University, Kirkuk Province, Iraq. The study areas were included 18 different sectors of Kirkuk center.

- **Sample Collection**

This survey was established in Kirkuk province during 15th February 2015 until 15th February 2016. Disparately, faecal specimens of stray (77) dogs *Canis* spp. and (48) cats *Felis catus* were collected from 18 different regions. The collected specimens were kept in sealed dark plastic bags, labeled with necessary data, such as time, date, quarter, and kept in icebox in *situ*, then transferred directly to the advance parasitic laboratory of the Biology Department, College of Science, Kirkuk University, and stored at 4 C° until laboratory examinations processing.

- **Parasitological Procedure**

Each fresh faecal specimen was examined for intestinal parasites separately, using a faecal flotation enrichment technique [7]. In brief, pea size of faeces were collected from each specimen, mixed with 20 ml of potassium iodomercurate then filtered. five ml volume test tube was fulfilled with the filtrate, covered with a proper cover slip and centrifuged at 2500 rpm for 5 min. Gently, the cover slip was transmitted onto a glass slide, marked with the necessary data of the specimen, stained by the modified Ziehl - Neelson technique.

The prepared smears were completely examined for *Cryptosporidium* spp. oocysts using a compound microscope, as described by [8]. For detection of stages of gastro-intestinal parasitic protozoa, smears of specimen were prepared and stained with trichrome / iodine dyes [9]. Each parasite stage was counted using 40x magnification. For ova and larvae detection, 100x and 400x magnifications were used.

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

- **Analysis of Results**

The data obtained from the fecal specimens collected dogs and cats were tested and analyzed using IBM SPSS Statistics version 22.0. The chi-square ($\chi^2$) test was confirmed to assess difference in the frequency of the intestinal parasites between the groups. In all the analysis, confidence interval was depended at 95% and statistical analyses were considered significant at $p \leq 0.05$.

## 3. Results:

The present investigation was carried out to determine the prevalence of GIP$^s$ in stray dogs and cats in Kirkuk province, Northern of Iraq. The overall investigated samples was 125. Fig. (1) and Fig. (2) summarize the observation of different parasitic species in stray dogs and cats, respectively.

The total significant prevalence percentage ($p < 0.05$) of GIP$^s$ with zoonotic parasites among (n=77) canine was 84.42% (n=65) Fig. (3a). As shown in Fig. (1). The highest infection among helminthes were found to be *Toxocara canis* (25.97%), *Diphylobotherium latum* (23.38%), followed by *Isospora* spp. (20.78%). Cestodes such as *Dipylidium caninum* and *Taenia hydatigera* percentage infection of 16.88%, 14.29%, respectively were also demonstrated in stray dogs.

Out of 48 stray cats faecal specimens subjected to the present study, 77.08% (n=37) were positive for GIP$^s$ significantly ($p < 0.05$) Fig. (3b) the highest infection was found to be *Toxocara cati* (39.58%), *Taenia taeniaeformis* (70.83%), followed by *Isospora* spp. (10.41%) and *Toxoplasma gondii* (8.33%) Fig ( 2). As shown in Table (1) the GIP$^s$ infections with the exception of *T. canis* and *E. granulosus* were found to be more prevalence in adults than in puppies.

However, no significant difference was observed in the overall investigation of GIP$^s$ infections among subjected two group dogs to the current stud .

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

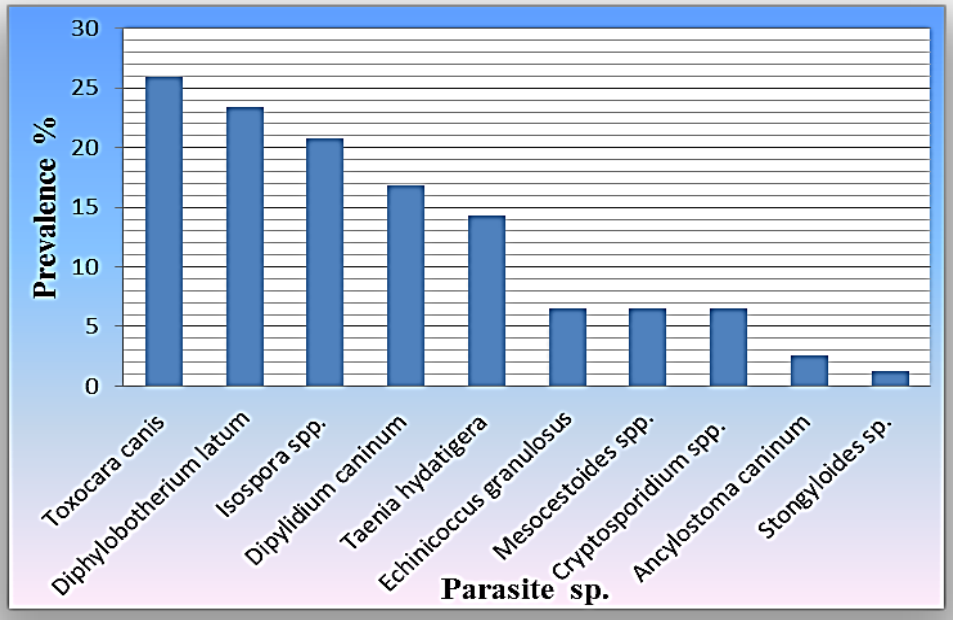


**Fig. (1):** Prevalence of GIPs among examined stray dogs in Kirkuk province.

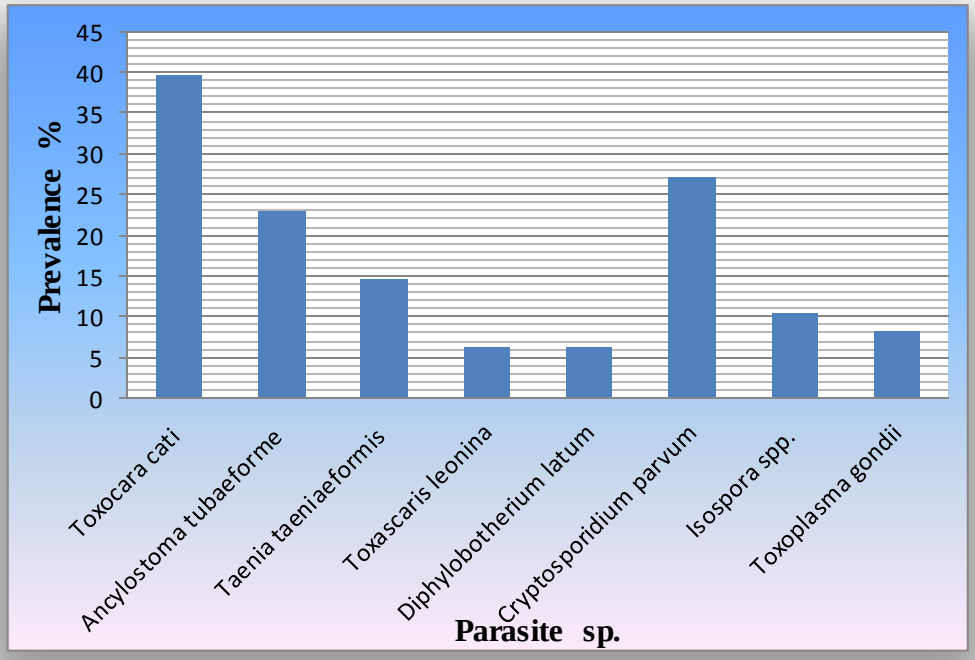


**Fig. (2):** Prevalence of GIPs among examined stray cats in Kirkuk

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

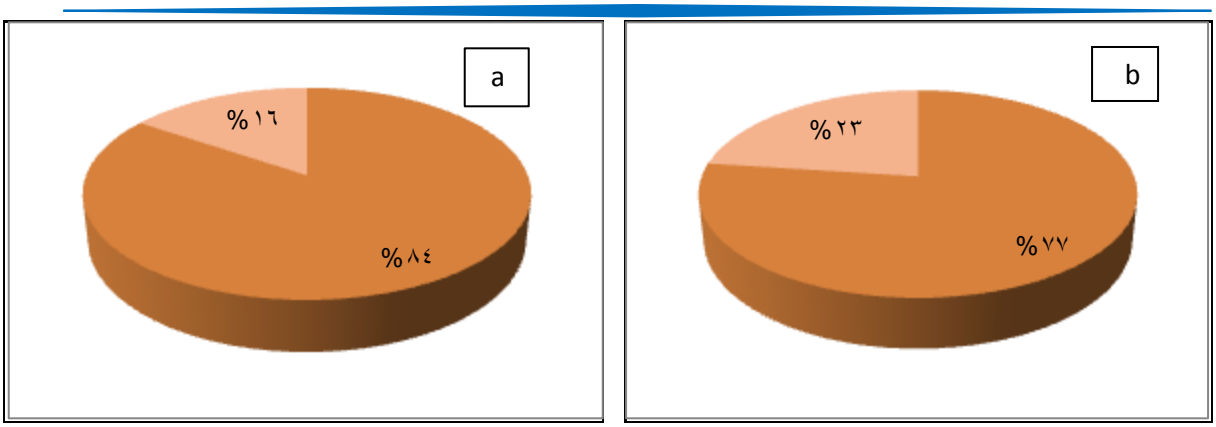


**Fig. (3):** The total prevalence percentage of GIP[s]; (a) in stray dogs, (b) in stray cats.

**Table (1):** Incidence of the observed GIPs species by age groups of dogs based on fecal coproscopic examination.

| Parasite sp. | Infected host % | | p | $X^2$ |
|---|---|---|---|---|
| | Puppies | Adult | | |
| Toxocara canis | 56 | 44 | 0.303 | 1.906 |
| Ancylostoma caninum | 37 | 48 | 0.28 | 2.87 |
| Taenia hydatigera | 33 | 45 | 0.44 | 1.43 |
| Echinicoccus granulosus | 36 | 25 | 0.49 | 2.109 |
| Dipylidium caninum | 12 | 18 | 0.503 | 1.487 |
| Mesocestoides spp. | 0 | 11 | 0.33 | 0.68 |
| Diphylobotherium latum | 2 | 6 | 0.82 | 0.96 |
| Stongyloides sp. | 35 | 47 | 0.401 | 2.203 |
| Isospora spp. | 11 | 14 | 0.52 | 2.51 |
| Cryptosporidium spp. | 5 | 7 | 0.442 | 2.33 |

## 4. Discussion

The zoonotic diseases and foodborne infections and intoxications are responsible for great economic losses, particularly in meat, milk and other food and products of animal origin, and that cost-effective analysis is indispensable as part of preparations for planning effective control schemes [10,11]. In the present study, the overall prevalence of stray dogs and cats

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

GIP$^s$ were 84.42% and 77.06%, respectively Fig. (3). These results considered to be a very high level of infection that require a cooperation between Iraqi Health Ministry and the World Health Organization (WHO) for establishing a radical effective anti-parasite control protocol. Additionally, other factors may play a major role in responsible for the wide range of endoparasite for instance; geographical position, sampling methodology, factors of demography and protocol of diagnostic [12,13]. In the present study, data revealed that among 77 stray dogs 65 (84.42%) were found to be harbored one or more species of zoonotic GIP$^s$. The most prevalence infections was two helminthes as shown in Fig. (1), i.e. *Toxocara canis* (25.97%) and *Diphylobotherium latum* (23.38%). Generally, these findings are similar to studies conducted in Iraq; i.e. in Sulaimania province [14]; in Diyala province [15]; in Duhok Province [16]. It is noteworthy, in the present study the infections with zoonotic GIP$^s$ such as *T. canis*, *Stongyloides* sp. and *Cryptosporidium* spp. were less than that previous reported in Baghdad city; 67.5%, 5% and 20.8% respectively [17]. Otherwise, the prevalence of *T. canis* and *E. granulosus* among young aged group was higher than among adults Table (1). However, only two GIP$^s$ protozoa *Isospora* spp. and *Cryptosporidium* spp. were common among the subjected dogs to the study. On the other hand, *D. latum* the fish common parasite is seen in the current study among both young's and adults aged groups, this may be attributed to the infected hosts were feed on the fish remains, and the parasite occasionally transferred to the dogs, as described by [18,19].

Concerning to the stray cats *Felis catus*, no studies were founded in the literatures dealing with the zoonotic GIP$^s$ in Northern of Iraq, only few related studies were reviewed in this context, for instance in Baghdad and Southern of Iraq, and on our knowledge, this is the first study in Northern of Iraq dealing with stray cats zoonotic GIP$^s$. However, in the present study, the infection percentages among stray cats with GIP$^s$ was vary between protozoa and helminthes. The study is recognized three helminthes *Toxocara cati*, *Ancylostoma tubaeforme*, *Taenia taeniaeformis* and one protozoa *Cryptosporidium* spp to be most prevalence in Kirkuk province with percentage infection of 39.58%, 22.92%, 14.58% and 27.08%, respectively. Low prevalence 6.25% also has been recorded for *Toxascaris leonina* and *D. latum*, this finding is agree with *Toxocara cati* result of [20] 'in Baghdad city'. The obtained results of *A. tubaeforme*, *T. leonina* and *D. latum* are agree with [21] 'in Al-Diwaniya city', while *Cryptosporidium* spp. and *Toxoplasma gondii* (27.08%, 8.33%) is

similar to previous reported in Baghdad city; 25.7%, 5% and 9.6%, respectively [22] 'in Baghdad city'.

The broad prevalence of these helminthes and/or protozoa among dogs and cats in Kirkuk province is an indication of lacking the hygienic awareness of the population that lead to environmental contamination with eggs and/or larvae of the zoonotic parasites. Where restaurant workers, local unauthorized butchers, fish sellers and people rids the slaughtered animal and fish remains offal's carelessly ignoring the risk of possibility of transmitting parasites eggs and/or larvae to stray dogs and cats, subsequently completing their life cycles. Hence, preventive measures should be implemented by the local health authority with the related parties represented in strictly intervened to avoid hazards of this unhygienic phenomenon.

## 5. Conclusions

Among 125faecal specimens of stray dogs and cats, 77 (84.42%) of stray dogs were positive for different GIPs. The infections were significantly vary between helminthes and protozoa, with the commonest GIPs were *Toxocara canis* (25.98%), *Diphylobotherium latum* (23.38%), *Isospora* spp. (20.78%), *Dipylidium caninum* (16.88%) and *Taenia hydatigera* (14.29%). While, 48 (77.08%) were significantly positive for GIP$^{s}$, *Toxocara cati* (39.58%), *Ancylostoma tubaeforme* (22.92%), *Taenia taeniaeformis* (14.58%), *Toxascaris leonina* (6.25%), *Diphylobotherium latum* (6.25%) and *Cryptosporidium* spp. (27.08%) were the most prevalence among stray cats in Kirkuk province. In the present study, data revealed that the overall prevalence of stray dogs and cats GIPs was 84.42% and 77.06%, respectively, and This is a very high risk level of infection prevalence that required reconsider in developing a rapid strategy to control the spread of the parasitic infection hazards. Encourage further more studies on GIPs, such as echinococcosis in different parts of the country to assess its importance as a cause of human health hazard..

## References

**[1]** R. C. Satyal,S. Manandhar,S. Dhakal,B. R. Mahato,S. Chaulagain, L. Ghimire and Y. R. Pan-deya ***"Prevalence of gastrointestinal zoonotic helminths in dogs of Kathmandu, Nepal"*** International Journal of Infectious Microbiology ,2(3), 91 (2013) .

Kirkuk University Journal /Scientific Studies (KUJSS)
Volume 13, Issue 1, March 2018, pp. (228-238)
ISSN 1992 – 0849

**[2]** G. R. Razmi*"Survey of Dogs, Parasites in Khorasan Razavi Province,Iran"* Iranian Journal of Parasitology,4(4), 48 (2009) .

**[3]** S. K. Borthakur and S. N. Mukharjee, *"Gastrointestinal Helminthes In Stray Cats (Felis catus) From Aizawl, Mizoram, India"* Southeast Asian Journal Tropical Medicine Public Health,42(2) , 255 (2011).

**[4]** S. Jittapalapong, T.Inparnkaew, N. Pinyopanuwat, C. Kengradomkij, A. Sangvaranond and S. Wongnakphet*," Gastrointestinal Parasites of Stray Cats in Bangkok Metropolitan Areas, Thailand"* Kasetsart Journal (Natural Science) ,41, 69 (2007).

**[5]** A. K. R.Barzinji,R. A. Mothana and A. K. Nasher "***Effect of leaf extracts of Dendr-osicyos socotrana and Jatropha unicostata on the viability of Echinococcus granulosus protoscoleces***" EurAsia Journal BioScience,3(16), 122 (2009) .

**[6]** E. Zewdu,Y. Semahegn and B. Mekibib "***Prevalence of helminth parasites of dogs and owners awareness about zoonotic parasites in Ambo town, central Ethiopia***" Ethiopian Veterinary Journal,14(2), 17 (2010).

**[7]** B. Davoust,T. Normand,O. Bourry,H. Dang,E. Leroy and G. Bourdoiseau *" Epidemiolo-gical survey on gastro-intestinal and blood-borne helminths of dogs in north-east Gabon"* Onderstepoort Journal of Veterinary Research,75(4), 359 (2008) .

**[8]** Causape, J. Qluilez, C. Sanchez-Acedo, *"Prevalence of intestinal parasites, including Cryptosporidium parvum, in dogs in Zaragoza city Spain"* Veterinary Parasitology,7(1), , 161 (1996) .

**[9]** M. Tanyuksel and W.A.Petri, *"Laboratory diagnosis of amoebiaisis"* Clinical Microbiology Reviews, 34, 713 (2003) .

**[10]** P. B. Chavhan, L. A.Khan, P. A. Raut, D. K. Maske, S. Rahman, K. S. Podchalwar and M. F. M. F.Siddiqui, *"Prevalence of Nematode parasites of Ruminants at Nagpur",* Veterinary World, 1(5) , 140 (2008) .

**[11]** R. Laha, M. Das and A. Goswami, *"Gastrointestinal parasitic infections in organized cattle farms of Meghalaya"* Veterinary World, 6(2), 109 (2013) .

**[12]** M. J. S. Mundim, L. A. G. Rosa, S. M. Hortencio, S. E. M.Faria, R. M. Rodrigues and M. C. Cury, *"Prevalence of Giardia duodenalis and Cryptosporidium spp. in dogs from different living conditions in Uberlandia, Brazil"* Veterinary Parasitol-ogy,144 , 356 (2007).

**[13]** S. Katagiri and T. C. G. Oliveira-Sequeira, ***"Prevalence of dogs' intestinal parasites and risk perception of zoonotic infection by dog owners in Sao Paulo State"*** Brazilian Zoonoses and Public Health, 55, 406 (2008).

**[14]** M. M. M. Bajalan, ***"Prevalence of intestinal helminths in stray dogs of Kalar city/Sulaimani province"*** Iraqi Journal of Veterinary Medicine, 34(1), 151 (2010).

**[15]** R. H. Hasson, ***"Stray Dogs Internal Parasites from Baquba City, Diyala Province,Iraq"*** Journal of Natural Sciences Research, 4(21), 75 (2014).

**[16]** T. A. Muhamed and L. T. O. Al-barwary, ***"Prevalence of Intestinal Parasites in the Intestine of Dogs (Sheep-Keeper, Owned, Pet and Stray) in Duhok Province,Kurdistan Region"*** Journal of Veterinar Science and Technology,7(6), 379, (2016).

**[17]** M. Hadi and A. A. Faraj, ***"Prevalence of Gastrointestinal Helminthes and Protozoa among Stray Dogs in Baghdad"*** Iraqi Journal of Veterinary Medicine,40(1), 1 (2016).

**[18]** T. Pullola, J. Vierimaa, S. Sarri, A. M. Virtala, S. Nikander and A. Sukura, ***"Canine intestinal hel-minths in Finland: prevalence, risk factors and endoparasite control practices,Veterinary Parasitology"***, 140 (3-4) , 321 (2006) .

**[19]** G. S. Khante, L. A. Khan, A. M. Bodkhe, P. R. Suryawanshi, M. A. Majed, U. S. Suradkar and S. S. Gaikwad, ***"Epidemiological survey of Gastro-intestinal Parasites of Non-descript dogs in Nagpur City"*** , Veterinary World, 2(1), 22 (2009).

**[20]** L. Al-Rubaie, F. T.Mhaisen, A. A. Al-Tae**,** ***"Survey of Some Gastrointestinal Cestodes and Nematodes from Stray Cats at Baghdad City,Iraq"*** American Journal of Biology and Life Science, 3(6), 246 (2015) .

**[21]** H. S. Al-Aredhi, ***"Prevalence of gastrointestinal parasites in domestic cats (Felis catus) in Al-Diwaniya province/Iraq",*** International Journal of Current Microbiology and Applied Science, 4(5) , 166 (2015) .

**[22]** M. Hadi and A. A. Faraj**,** ***"Role of domestic cats Felis catus as reservoir hosts of intern-ational parasites and protozoa in Baghdad"*** Bulletin of Iraqi National History Mus-eum,13(1), 89 (2014).